muſt multiply four times in order to raiſe the boat from the lower to the upper canal; hence let the drum be four feet diameter, B eight feet, C two feet; thus C, and the vertical wheel A, on the ſame ſhaft, will make four revolutions, while the drum performs one, and raiſe the boat four hundred feet while the tub deſcends one hundred.

Again, when the boat is to be raiſed out of the upper canal on the bridge of the plane, ſhe will move through a ſpace of about fifty feet, while the tub deſcends one hundred; thus the ſpeed is reverſed, the tub paſſing through more ſpace than the boat: for this purpoſe, let the diameter D be eight feet, and the diameter E two feet, *which is half the diameter of the drum*; and the vertical-wheel, A, will perform but one revolution while the drum makes two; and the tub will deſcend one hundred feet while the boat moves fifty, riſing out of the upper canal on the bridge of the plane; thus the two movements are produced by reverſing the diameters: and, to caſt them in and out of gear, C and D work on a round part of the ſhafts, and may turn round though the ſhaft ſtood ſtill, *which will be the caſe on the return of the water tub*; between the two there is a boſs, on the ſquare part of the ſhaft, which allows it to move from ſide to ſide, but cannot turn except with the ſhaft: when it is neceſſary C, and B, ſhould be in action for the quick movement, the boſs is caſt into C, by means of the lever, and D turns round on the ſhaft without confining the works; when the ſlow movement is to be performed, in raiſing the boat out of the upper canal, the boſs is caſt into D, and C is left at liberty; by this means, the teeth of the wheels are always in gear, and the boſs fixes that to the ſhaft which is to act, leaving the other to turn as the revolution of its opponent requires; the boſs will alſo

leave both wheels at liberty, as in the Drawing, which muſt be the caſe while the tub returns to the top of the pit.

For the purpoſe of raiſing the boat out of the upper canal, there is a roller placed beneath the vertical-wheel, as at F and G, Fig. II. round which the chain makes a double; in raiſing the boat to the upper canal, ſhe muſt be hooked at the ſtern, or lower end; and before the chain comes to a perpendicular, under the vertical-wheel, the boat will paſs the bridge of the plane and run into the upper canal, conveying with it the chain under the roller, at F, which repreſents the boat entering the upper canal.

On raiſing the boat out of the upper canal, ſhe is alſo hooked behind, as at G; the machine being then put into action, and the chain bearing on the roller G, will draw her over the bridge; when caſting off the water-tub, ſhe immediately begins to deſcend without further trouble, the movement being regulated either by a break or centrifugal fans.

At bottom, ſhe is unhooked, and a boat linked to the chain, the man at top caſting the boſs into C, draws water into the tub till a power is created; and the boat will riſe the plane, paſs the bridge, and run into the upper canal, the man caſting off the boſs on paſſing the bridge.

The whole of this operation may be performed in ſix minutes, conſequently, four tons up and four down, in ſix minutes, will amount to nine hundred and ſixty tons in twelve hours: ſhould the trade ſurpaſs this quantity, the machine may work by night, as mentioned of the firſt apparatus; conſequently, one thouſand nine hundred and twenty tons may be performed in twenty-four

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